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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/914,306	07/16/2002	Young Suk Lee	5204-22	2394

7590 11/15/2004

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EXAMINER	
CROWELL, ANNA M	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/914,306	LEE ET AL	
	Examiner	Art Unit	
	Michelle Crowell	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 27, 2004 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hijikata et al. (U.S. 5,254,214) in view of Salimian et al. (U.S. 5,716,485).

Referring to Figure 4, column 4, lined 13-48, and column 5, lines 33-37, Hijikata et al. discloses a semiconductor manufacturing apparatus comprising a chamber 202 having a gas inlet 204 (col. 4, lines 18-20) and a gas outlet 212 (col.4, lines 40-44), the chamber having an upper part with a dome configuration (col. 4, line 14); a susceptor 209 provided in the chamber to place a wafer thereon (col. 4, lines 63-67); a non-mesh plasma electrode 206 to which RF power 205 is applied to generate a plasma within the chamber (col. 4, lines 20-23); wherein the plasma electrode is of a dome shape to cover the upper part, and wherein the electrode 206 has a lower opening and an upper opening. Additionally, Hijikata et al. discloses applying an RF power of about 500W to 1000W to the plasma electrode (col.3, line 10, col.6, line 17). Furthermore, the upper opening overlies the lower opening, the upper opening has a diameter smaller than the lower opening, and the lower opening is closer to the susceptor 209 than the upper opening.

Hijikata et al. fails to explicitly teach that the plasma electrode is of a truncated dome shape and that the diameter of the upper opening has a specific size.

Referring to Figures 8 and 16 and column 4, line 46-column 6, line 63, Salimian et al. teaches an apparatus wherein the plasma electrode 90 is of a truncated dome shape in order to control the uniformity of the processing across the wafer (col. 5, line 65-col. 6, line 3, col. 6, lines 48-63, col. 7, lines 36-40). Additionally, as shown in Figure 20, the apex (i.e. corresponding to upper opening) of the truncated dome shaped electrode 90 has been given a diameter size of 76.2 mm (3 inches) (col. 4, line 59-col. 5, line 9). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the dome

electrode of Hijikata et al. with a truncated dome with an upper opening having a diameter size of 76.2 mm as taught by Salimian et al. since this would control the uniformity of the processing across the wafer.

Regarding the upper opening having a width of about 70mm to 300mm (claims 2 and 8), the apparatus of Hijikata et al. in view of Salimian et al. provides a width of 76.2 mm in the upper opening of the dome electrode. Furthermore, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Therefore, the rejection of Hijikata et al. in view of Salimian et al. satisfies the structural requirements of claims 2 and 8.

With respect to claim 7, Hijikata et al. discloses that the inner diameter of the electrode gradually becomes smaller from the bottom of the electrode toward the top of thereof (see attached Fig.4).

With respect to the phrase, " to deposit a thin film having a uniform thickness", it is considered intended use. Moreover, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed (i.e. depositing a thin film) does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the **structural limitations** of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Additionally, while the features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of **structure** rather than function (In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997)). Therefore, the apparatus of Hijikata et al. in view of Salimian et al.

satisfies the structural limitations of claims 1, 2, 7, and 8 and is capable of depositing a thin film having a uniform thickness since Salimian controls the uniformity of processing.

6. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hijikata et al. (U.S. 5,254,214) in view of Salimian et al. (U.S. 5,716,485) as applied to claims 1 and 7 above, and further in view of Takagi et al. (U.S. 4,539,068).

The teachings of Hijikata et al. in view of Salimian et al. have been discussed above.

Hijikata et al. in view of Salimian et al. fail to teach the gases SiH_4 and NH_3 to form a Si_xN_y thin film having a uniform thickness.

Referring to Figure 3 and column 3, line 64-column 4, line 21, Takagi et al. teaches that it is known to provide a hydrogen containing plasma gases made of SiH_4 and NH_3 to form a silicon nitride film (Si_xN_y thin film) having a uniform thickness. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the process chamber of Hijikata et al. in view of Salimian et al. with the claimed gases as taught by Takagi et al. since these are known gases used to form silicon nitride thin films.

7. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hijikata et al. (U.S. 5,254,214) in view of Salimian et al. (U.S. 5,716,485) as applied to claims 1 and 7 above, and further in view of Ong et al. (U.S, 5,645,900).

The teachings of Hijikata et al. in view of Salimian et al. have been discussed above.

Hijikata et al. in view of Salimian et al. fail to teach gases CH_4 and H_2 to form a DLC thin film, and SiH_4, CH_4, and H_2 to form a SiC thin film.

Referring to column 6, line 35 – column 7, line 6, and line 30 and 47, Ong et al. teaches that it is known to provide a hydrogen containing plasma gases made of CH_4 and H_2 to form a DLC thin film and to mix SiH_4, CH_4, and H_2 to form a SiC thin film having uniform thickness. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the process chamber of Hijikata et al. in view of Salimian et al. with claimed gases as taught by Ong et al. since these are known gases used to form a DLC thin film and a SiC thin film.

Response to Arguments

8. Applicant's arguments filed October 27, 2004 have been fully considered but they are not persuasive.

Applicant has argued that a functional limitation must be evaluated and considered, just like any other limitation of the claim. However, as stated above, while the features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function (In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997)).

Applicant has argued that Hijikata et al. and Salimian et al. teach a plasma electrode structured for etching substrates. However, the apparati of Hijikata et al. and Salimian et al. are capable of depositing thin films by simply changing the type of gases that are supplied to either of the chambers. Thus, it should be noted that "expressions relating the apparatus to contents thereof during an intended operation **(i.e. depositing a thin film)** are of no significance in determining patentability of the apparatus claim." (Ex parte Thibault, 164 USPQ 666, 667 (Bd.

App. 1969)). Furthermore, "inclusion of material **(i.e. depositing gases)** worked upon by a structure being claimed does not impart patentability to the claims." (In re Young, 75 F.2d *996, 25 USPQ 69 (CCPA 1935) (as restated in In re Otto, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963))). Additionally, Hijikata et al. teaches the apparatus can be used for a deposition process (col. 5, lines 21-23).

Applicant has argued that none of the cited references teach or disclose "a diameter of an upper opening sized to form a uniform thickness". However, the truncated dome shaped electrode (Salimian et al.) has a specific diameter size of 76.2 in order to ensure plasma processing uniformity (col. 3, lines 1-4, col. 4, line 66-col. 5, line 2)

Applicant has argued that in Salimian et al., the opposite arrangement, e.g., the "apex is lowest and a wider base overlies the apex. However, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). As stated above in the office action, the plasma electrode 206 of Hijikata et al. teaches an upper opening that overlies the lower opening, and the upper opening has a diameter smaller than the lower opening (see. Fig. 4). Furthermore, the test for obviousness is not whether the features of a secondary reference (i.e. Salimian et al.) may be bodily incorporated into the structure of the primary reference (Hijikata et al.); nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Therefore, the Salimian et al. reference was simply applied for the teachings of a **truncated** dome shaped

electrode having a upper opening with a specific diameter size. As a result, the rejection of Hijikata et al. in view of Salimian et al. satisfies the claimed requirements.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (9:00 - 5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AMC
11-05-04

SUPERVISORY PATENT EXAMINER